CLAIMS

WHAT IS CLAIMED:

1. A method, comprising:

providing a semiconducting substrate having a first layer of insulating material formed thereabove, said first layer of insulating material having at least one conductive structure positioned therein; and

performing an ion implant process to implant ions into at least said at least one conductive structure.

2. The method of claim 1, further comprising forming a second layer of insulating material above said first layer of insulating material and said at least one conductive structure.

3. The method of claim 1, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

4. The method of claim 1, wherein said at least one conductive structure is comprised of a metal.

5. The method of claim 1, wherein said at least one conductive structure is comprised of copper.

6. The method of claim 1, wherein performing an ion implant process to implant ions into at least said at least one conductive structure comprises performing an ion implant

process to implant ions into said first layer of insulating material and into said at least one conductive structure.

7. The method of claim 1, wherein performing an ion implant process to implant ions into at least said at least one conductive structure comprises performing an ion implant process to implant ions only into said at least one conductive structure.

8. The method of claim 1, wherein performing said ion implant process comprises performing said ion implant process using at least one of nitrogen, carbon, silicon and hydrogen.

9. The method of claim 1, wherein performing said ion implant process comprises performing said ion implant process at a dopant dose that ranges from approximately $1e^{13}$-$1e^{21}$ ions/cm^2.

10. The method of claim 1, wherein performing said ion implant process comprises performing said ion implant process at an energy level ranging from approximately 1-200 keV.

11. The method of claim 1, wherein performing an ion implant process to implant ions into at least said at least one conductive structure comprises performing an ion implant process to implant ions into at least said at least one conductive structure to thereby form a doped region in at least said conductive metal structure.

12. The method of claim 11, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

13. The method of claim 11, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

14. The method of claim 11, further comprising forming a second conductive metal structure above said doped region in said at least one conductive metal structure.

15. A method, comprising:

providing a semiconducting substrate having a first layer of insulating material formed thereabove, said first layer of insulating material having at least one conductive copper structure positioned therein; and

performing an ion implant process to implant ions into at least said at least one conductive copper structure, said implanted ions comprised of at least one of hydrogen, carbon, silicon and nitrogen.

16. The method of claim 15, further comprising forming a second layer of insulating material above said first layer of insulating material and said at least one conductive copper structure.

17. The method of claim 15, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

18. The method of claim 15, wherein performing an ion implant process to implant ions into at least said at least one conductive copper structure comprises performing an ion implant process to implant ions into said first layer of insulating material and into said at least one conductive copper structure.

19. The method of claim 15, wherein performing an ion implant process to implant ions into at least said at least one conductive copper structure comprises performing an ion implant process to implant ions only into said at least one conductive copper structure.

20. The method of claim 15, wherein performing said ion implant process comprises performing said ion implant process at a dopant dose that ranges from approximately $1e^{13}$-$1e^{21}$ ions/cm^2.

21. The method of claim 15, wherein performing said ion implant process comprises performing said ion implant process at an energy level ranging from approximately 1-200 keV.

22. The method of claim 15, wherein performing an ion implant process to implant ions into at least said at least one conductive copper structure comprises performing an ion implant process to implant ions into at least said at least one conductive copper structure to thereby form a doped region in at least said conductive metal structure, said doped region being comprised of at least one of said implant ions.

23. The method of claim 22, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

24. The method of claim 22, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

25. The method of claim 22, further comprising forming a second conductive copper structure above said doped region in said at least one conductive copper structure.

26. A method, comprising:

providing a semiconducting substrate having a first layer of insulating material formed thereabove, said first layer of insulating material having at least one conductive metal structure positioned therein; and

performing an ion implant process to implant ions into said at least one conductive metal structure and into said first layer of insulating material.

27. The method of claim 26, further comprising forming a second layer of insulating material above said first layer of insulating material and said at least one conductive metal structure.

28. The method of claim 26, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

29. The method of claim 26, wherein said at least one conductive metal structure is comprised of copper.

30. The method of claim 26, wherein performing said ion implant process comprises performing said ion implant process using at least one of nitrogen, carbon, silicon and hydrogen.

31. The method of claim 26, wherein performing said ion implant process comprises performing said ion implant process at a dopant dose that ranges from approximately $1e^{13}$-$1e^{21}$ ions/cm^2.

32. The method of claim 26, wherein performing said ion implant process comprises performing said ion implant process at an energy level ranging from approximately 1-200 keV.

33. The method of claim 26, wherein performing an ion implant process to implant ions into said at least one conductive metal structure and into said first layer of insulating material comprises performing an ion implant process to implant ions into said at least one conductive metal structure and into said first layer of insulating material to thereby form a doped region in said at least one conductive metal structure and in said first layer of insulating material.

34. The method of claim 33, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

35. The method of claim 33, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

36. A method, comprising:

providing a semiconducting substrate having a first layer of insulating material formed thereabove, said first layer of insulating material having at least one conductive metal structure positioned therein; and

performing an ion implant process to selectively implant ions only into said at least one conductive metal structure.

37. The method of claim 36, further comprising forming a second layer of insulating material above said first layer of insulating material and said at least one conductive metal structure.

38. The method of claim 36, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

39. The method of claim 36, wherein said at least one conductive metal structure is comprised of copper.

40. The method of claim 36, wherein performing said ion implant process comprises performing said ion implant process using at least one of nitrogen, carbon, silicon and hydrogen.

41. The method of claim 36, wherein performing said ion implant process comprises performing said ion implant process at a dopant dose that ranges from approximately $1e^{13}$-$1e^{21}$ ions/cm^2.

42. The method of claim 36, wherein performing said ion implant process comprises performing said ion implant process at an energy level ranging from approximately 1-200 keV.

43. The method of claim 36, wherein performing an ion implant process to selectively implant ions only into at least said at least one conductive metal structure comprises performing an ion implant process to selectively implant ions only into at least said at least one conductive metal structure to thereby form a doped region in at least said conductive metal structure.

44. The method of claim 43, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

45. The method of claim 43, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

46. The method of claim 43, further comprising forming a second conductive metal structure above said doped region in said at least one conductive metal structure.

47. An integrated circuit device, comprising:

a first layer of insulating material positioned above a semiconducting substrate; and

at least one conductive metal structure positioned in said first layer of insulating material, said at least one conductive metal structure having a doped region formed therein adjacent a first surface of said at least one conductive metal structure.

48. The device of claim 47, further comprising a second layer of insulating material positioned above said first layer of insulating material and said at least one conductive metal structure.

49. The device of claim 47, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

50. The device of claim 47, wherein said at least one conductive metal structure is a conductive metal line for said integrated circuit device.

51. The device of claim 47, wherein said at least one conductive metal structure is comprised of copper.

52. The device of claim 47, wherein said doped region is comprised of at least one of nitrogen, carbon, silicon and hydrogen.

53. The device of claim 47, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

54. The device of claim 47, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

55. The device of claim 47, further comprising a second conductive metal structure positioned in said second layer of insulating material above said doped region formed in said at least one conductive metal structure.

56. The device of claim 47, wherein said second layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

57. An integrated circuit device, comprising:

a first layer of insulating material positioned above a semiconducting substrate; and

at least one conductive metal structure positioned in said first layer of insulating material, said at least one conductive metal structure and said first layer of insulating material having a doped region formed therein.

58. The device of claim 57, further comprising a second layer of insulating material positioned above said doped region formed in said first layer of insulating material and in said at least one conductive metal structure.

59. The device of claim 57, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

60. The device of claim 57, wherein said at least one conductive metal structure is a conductive metal line for said integrated circuit device.

61. The device of claim 57, wherein said at least one conductive metal structure is comprised of copper.

62. The device of claim 57, wherein said doped region is comprised of at least one of nitrogen, carbon, silicon and hydrogen.

63. The device of claim 57, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

64. The device of claim 57, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

65. The device of claim 57, wherein said second layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

66. The device of claim 57, further comprising a second conductive metal structure positioned in said second layer of insulating material above said doped region formed in said at least one conductive metal structure.

67. An integrated circuit device, comprising:

a first layer of insulating material positioned above a semiconducting substrate; and

at least one conductive copper structure positioned in said first layer of insulating material, said at least one conductive copper structure having a doped region formed therein adjacent a first surface of said at least one conductive copper structure, said doped region being comprised of at least one of nitrogen, carbon, silicon and hydrogen.

68. The device of claim 67, further comprising a second layer of insulating material positioned above said first layer of insulating material and said at least one conductive copper structure.

69. The device of claim 67, wherein said first layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

70. The device of claim 67, wherein said at least one conductive copper structure is a conductive copper line for said integrated circuit device.

71. The device of claim 67, wherein said doped region has a thickness that ranges from approximately 5-50 nm.

72. The device of claim 67, wherein said doped region has a dopant concentration level that ranges from approximately $1e^{15}$-$1e^{21}$ ions/cm^3.

73. The device of claim 67, wherein said second layer of insulating material is comprised of at least one of silicon dioxide and BPSG.

74. The device of claim 67, further comprising a second conductive metal structure positioned in said second layer of insulating material above said doped region formed in said at least one conductive metal structure.